

TITLE: METHOD AND APPARATUS FOR QUICK WASH CYCLE FOR CLOTHES WASHER

5 BACKGROUND OF THE INVENTION

The present invention relates generally to clothes washers, and more specifically to a quick rinse cycle for rinsing textiles in order to reduce the overall wash cycle time. Rinse cycles are utilized in washing apparatuses to assist in the removal of soil and detergent from textiles. The washing apparatus often has a tub and movable basket which is located within the tub. Typically during the rinse cycle the washing apparatus is filled with water and the basket and/or textiles are agitated, often with an agitator, to assist in removing remaining soil and detergent. However this method utilizes a considerable amount of water and a considerable amount of time during the periods of filling the tub and the periods of draining the tub.

15 Others have approached this problem by spraying the clothes in the basket while spinning the basket, as taught, for example, by Mueller, et al. in U.S. Patent No. 5,504,955, by Euler, et al., in U.S. Patent No. 5,191,669 and by Badger, et al., in U.S. Patent No. 5,737,790, as well as others. These examples all teach spraying a rinse on the clothes, through utilization of a rinse spraying mechanism, while spinning the basket in various 20 manners. For example, Mueller teaches spinning the basket in a “wobbling motion” while under a spray. Alternatively, Euler teaches spinning of the basket, which is orientated about a horizontal plane, and spraying the basket while the basket spins at a rate of speed sufficient to generate more than one gravity centrifugal force.

However, such methods tend to cause water to be propelled, or escape, out of the 25 spinning tub. More specifically, when the spinning occurs, there is a substantial amount of

internal airflow generated. This airflow creates eddies and other air flow characteristics which are often associated with air flow, and especially turbulent flow which is often found in such a system. This turbulent flow is likely due to the spinning of the basket, agitator and textiles contained therein. This internal airflow may cause water, often from the rinse spraying mechanism, to escape through the gap between the basket and the top cover.

Therefore, one objective, feature or advantage of this invention is to provide a method and control mechanism to prevent the escape of spray water from the washing apparatus.

Another objective, feature or advantage is to provide a method and control mechanism that utilizes less water to rinse textiles.

Yet another objective, feature or advantage is to provide a method and control mechanism that utilizes less time to rinse textiles.

Still yet another objective, feature or advantage of the present invention is to provide a method and a control device that assists in rinsing lightly soiled textiles.

These and/or other objects, features, or advantages of the present invention will become apparent from the specifications and claims.

SUMMARY OF THE INVENTION

The present invention provides a method of performing a quick rinse cycle that exhibits a reduced water usage as compared to a washing apparatus that utilizes a full deep rinse cycle as well as reduction in time required for the rinse cycle. Reduction in rinse cycle time also results in a reduction of overall wash cycle time. The present invention also provides a control mechanism and an associated controller that can accomplish the rinse cycle above and the reduction of escaped water in a washing apparatus.

The present invention introduces a pause period of the spinning of the basket during the rinse cycle. As the basket is not substantially in motion for a period of time during the pause period, the resulting water escape, which is due to the spinning of the basket, is reduced if not eliminated. While a seal can be placed in the washing apparatus between the lid and the tub to assist in preventing the water escape, this method proves to be rather expensive. Therefore, the present invention assists in reducing the need for the designer to utilize such a seal in the washing apparatus, and thereby also assists in decreasing the cost of manufacturing and servicing such a washing apparatus.

Generally described, an aspect of the present invention is the provision of a method of rinsing a textile wash load in a washing apparatus by spinning a basket, which is configured to hold textiles, with a motor. The spinning of the basket is paused for a period of time. After the pause, spinning of the basket is resumed. As the basket is being paused and as the spinning is resumed, the textiles in the basket are sprayed with a water spray. It is preferable to use a brake to pause the spinning of the basket. Conversely, when unpausing the spinning of the basket it is preferable to use a clutch to unpause, or reengage, the spinning of the basket. The basket may be repaused during the second spinning of the basket and then reinitiate the spraying mechanism. If this is done, it is preferred that the spinning of the basket is substantially stopped or in the process of braking during the spraying of the textile wash load for the second time.

Another aspect of the present invention is that it provides a textile rinse system that has a textile basket wherein the interior of the basket may receive textiles. A basket motor is operatively connected to the basket so the motor can actuate the spinning of the basket. A spray mechanism is positionally located in a manner to allow the spraying water on the textiles located in the interior of the basket. A controller is also operatively connected to

the motor, as well as the spraying mechanism, so that the controller can cause the basket to substantially stop spinning while the spraying mechanism sprays, as well as causing the spraying mechanism to substantially stop while the basket is spinning. As before, it is preferable for the system to have a brake to assist in stopping, or pausing, the spinning of the basket. A clutch is also preferably included in the system to assist in starting, as well as restarting, the spinning of the basket. The controller preferably uses cams that assist in the timing of the spinning of the basket in relation to the spraying of the textiles. It is preferable that the timing of the spinning of the basket is so set so that the basket is stopped or in the process of stopping while the textiles are sprayed. Yet another aspect of the present invention is a control mechanism for a washing apparatus where the washing apparatus is the kind that has a basket and a spray mechanism. The apparatus also has a motor, which is operatively connected to the basket for spinning of the basket. Additionally, the apparatus has a brake, wherein the brake is operatively connected to the basket so that it might assist in stopping the spinning of the basket. A controller is included and it is operatively connected to the motor, spray mechanism and brake so that the controller can pause the basket while activating the spray mechanism. It is preferable so that the controller ensures that the spray mechanism is substantially stopped prior to enabling the spinning of the basket.

Still yet another aspect of the present invention is the provision of a method for reducing wash cycle time in a washing apparatus. After a fill and agitate cycle, the method provides for spinning of the basket containing laundry items. Then the spinning of the basket is paused by disengaging a motor drive and braking. During the step of pausing, a spraying mechanism is activated to apply rinse water to the laundry items. Then spinning of the basket is resumed.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a front view of one embodiment of the washing machine according to the present invention.

5 Figure 2 is a cross sectional view of the inside of a washing machine according to one embodiment of the present invention.

Figure 3 is a timing diagram according to one embodiment of the present invention.

Figure 4 is an electrical schematic according to one embodiment of the present invention.

10 Figure 5 is a flow chart according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention meets the needs described above for a rinse cycle for a textile washing apparatus, as well as a controller and control mechanism for utilizing such a rinse
15 cycle. The present invention may be understood more readily by reference to the following detailed description of the invention taken in connection with the accompanying drawing figures, which form a part of this disclosure. It is to be understood that this invention is not limited to the specific devices, methods, conditions or parameters described and/or shown herein, and that the terminology used herein is for the purpose of describing particular
20 embodiments by way of example only and is not intended to be limiting of the claimed invention.

Figure 1 illustrates one embodiment of the washing apparatus or machine of the present invention. In Figure 1, the washing machine 10 includes a cabinet 12 and a control panel 14. In the embodiment of the control panel 14 shown, control 16 is a dial to set the
25 size of the wash load. Control 18 is a dial to set the water temperature for the wash and for the rinse. The control 20 is a dial for setting the type of fabric or textile, such as whether the appropriate setting should be hand wash, delicate, permanent press, cotton/colors, or

regular/whites. Control 22 is an extra rinse on/off control. Control 24 is a dial for setting the wash cycle and it preferably includes a separate setting for a quick wash according to the present invention.

Figure 2 illustrates a partial cross sectional view of one embodiment of a washing machine according to the present invention. In Figure 2, the washing machine 10 includes a cabinet or housing 12. The cabinet or housing 12 includes a lid 30. Disposed within the cabinet or housing 12 is a basket 32 for holding fabric, textiles, or other laundry items (not shown). An agitator 34 for causing agitation of the contents of the basket 32 is also shown. A drive assembly 36 is illustrated. The drive assembly 36 includes a bi-directional rotary motor 37 with an output drive shaft 38. The motor 37 is operated in a first direction during periods of agitation, and in the second direction during spin. A first pulley 39 is fixedly secured for rotation with output drive shaft 38 and is adapted to drive a second pulley 40 through a belt (not shown) which in turn drives the input drive shaft 41. A transmission assembly 44 is adapted to drive the rotation of the basket 32 which is secured to basket hub 42, in the spin direction of rotation of motor 37.

To stop or slow down or otherwise pause the spinning basket 32 a brake 43 is provided. The brake assembly 43 includes a brake stator 47, a brake rotor 48 and a compression spring 49. The brake assembly 43 is conventional in nature and is well-known in the washing machine art. A description of operation is included only for the sake of completeness.

When the motor 37 is operating in the agitation direction, the brake assembly 43 functions to keep the basket 32 stationary so that the mechanism of the transmission 44 can cause the agitator 34 to oscillate. This is accomplished with the brake rotor 48 in contact with the brake stator 47.

When the motor 37 is operated in the spin direction, a cam arrangement (not shown) initially disengages the brake rotor 48 from the brake stator 47, compressing spring 49. This action enables the pulley 40, brake rotor 48, transmission assembly 44, agitator 34 and basket 32 to rotate together. A clutch 45 is used to unpause the spinning of the basket 32. The clutch 45 enables the drive assembly 36, pulley 40 and input drive shaft 41 to immediately rotate at the selected speed. Clutch 45 limits the amount of torque transferred from the input shaft 41 to the transmission assembly 44 and basket 32. This torque limiting function results in a slow acceleration of the basket 32 to the selected spin speed.

When the basket 32 is spinning at the selected speed, removal of power to the motor 37 will instantly cause the brake rotor 48 to re-engage with the brake stator 47. The basket 32 will decelerate from the selected speed to a complete stop. Typically, the deceleration occurs during a time period that is less than 10 seconds, although other rates of deceleration are possible.

A water injector 46 is shown for spraying water on to laundry items within the basket 32. The water injector 46 is in a fixed location. A spray rinse is performed when the spinning clothes load is presented to a stream of water that is flowing through injector 46. The motor 37 is a standard alternating current, induction motor with one or more discreet speeds. Usage of such a motor, while economical, presents some issues for utilization of spray rinses. The speeds available drive the basket 32 at speed high enough to create air currents, due to the spinning agitator 32 and clothes load, which may cause the injected water to escape through the gap between the basket 32 and housing 12. As a result, the number and length of the spray rinses have traditionally been limited to prevent the escape of water. In the subject invention, a pause in the basket 32 spinning action is included. By pausing and restarting the spin action, the brake assembly 43 and clutch 45

can be utilized to control the spinning speed of the basket 32 at a speed lower than any of the available motor 37 speeds. This enables the derivation of greater performance from the spray rinse without resorting to the addition of expensive seals to contain the water.

The present invention is not limited to the specific configuration shown in Figure 2.

5 Figure 2 is merely one embodiment of a washing machine that includes a spinning basket that can be paused and is adapted for the spraying of water during a quick wash cycle. Many differences in structure are contemplated as may be appropriate in a particular design or product.

Figure 3 illustrates a timing diagram according to one embodiment of the present
10 invention. The timing diagram illustrates the state of the cams used to control the washing machine. Each cam has an associated top contact position, represented by a "T" in the timing diagram 50 and a bottom contact position, represented by a "B" in the timing diagram 50. There is a washing function associated with each contact position of the cam. The timing diagram illustrates the cam status and therefore the function being performed at
15 various points in time during a wash cycle. The timing diagram shows the various types of cycles along the bottom row and the functions associated with those cycles. The present invention relates to the quick wash cycle. The quick wash cycle is shown between time interval or increment 24 and time increment 29. During time increments 24 and 29, the washing machine is turned off. During time of increments 25 and 26, there is a normal
20 wash water fill which coincides with normal wash water fill and coincides with various functions associated with different cams. For example, it can be seen that associated with the top portion of cam 2 (62), the fill and agitate control is closed. Associated with the bottom portion of cam 3 (63), there is an intermittent speed slow. Associated with the top portion of cam 4 (64), there is a wash fill. Corresponding to the top portion of cam 5 (65)

there is a reversing agitation occurring. After this normal wash water fill and agitation, during time increment 27 there is a 3 minute continuous spin cycle with 15 seconds of spray occurring after 100 seconds. At this point, the timer interval or increment 27 is complete, and the motor is interrupted for 10 seconds with a simultaneous initiation of water flow or fill occurs. Thus, during this interruption of the motor, the brake decelerates the basket 32, and rinsing water is added without increases in cycle time or the potential for splash. The temporary stopping of the spinning tub protects against water coming into contact with rapidly moving clothing and the resulting splash that could occur. Then, fill is continued with spinning for an additional 20 seconds. The clutch 45 is controlling the acceleration of the basket during most or all of this period of spray rinsing. Thus a 30 second spray rinse is accomplished, without increases in cycle time, and with little or no water escaping from the basket 32. The timer increment 28 includes a 3 minute spin with 15 seconds of spray occurring after 100 seconds have elapsed. The overall time for a wash cycle would include 12 minutes plus the time required for one wash fill.

The timer information in Figure 3 shows the status of each cam with cam 1 represented by reference numeral 61, cam 2 indicated by reference numeral 62, cam 3 indicated by reference numeral 63, cam 4 indicated by reference numeral 64, cam 5 indicated by reference numeral 65, cam 6 indicated by reference numeral 66, cam 7 represented by reference numeral 67 and cam 8 represented by reference numeral 68.

The time chart shows more than the quick wash cycle in order to provide proper context for the present invention. The cam configuration shown is merely one configuration that can be used. In fact, the present invention need not be limited to control by cams, but could be implemented with other types of control systems.

Figure 4 is an electrical schematic that corresponds to the timing diagram shown in Figure 3. The location of cams 1-8 (61, 62, 63, 64, 65, 66, 67, and 68) are shown. The electrical schematic shown is simply for illustrative purposes, the invention is not limited to the specific electrical system shown. In Figure 4, the various componentry includes a lid switch 72 for sensing that the lid is open or closed, drive motor 37 for spinning the basket, a water temperature switch 74, water valve 76, water level switch 78, timer motor 80, speed switch 82, and an extra rinse switch 84.

In operation, each cam, including either or both of its top portion and bottom portion, controls associated washer functions. Figure 4 merely provides an illustration of one embodiment of the electrical relationships between the different cams and the washing machine components, controlled by the cams.

Figure 5 provides a flow diagram according to one embodiment of the present invention. In step 100 of Figure 1, the quick wash cycle is started. In step 102, a normal wash water fill is performed with agitation. In the preferred embodiment this fill and agitation takes place for a 6 minute period plus the time required to fill the basket 32 with water. Then in step 104 there is 100 seconds of spin. In step 105, there is continued spinning with rinse fill or spray for 15 seconds. In step 106, spinning continues for 65 seconds. In step 107, there is motor interruption concurrent with rinse fill or spray for 10 seconds. During this step, the brake assembly 43 is decelerating the basket 32 to reduce or eliminate the escape of water. The motor interruption pauses the spinning of the basket. It should be understood that the term "pause" does not necessarily require a complete stopping of the basket as stopping is not likely to be instantaneously achieved. In the preferred embodiment, pausing is performed by disengaging of the drive motor (motor interruption) and braking of the basket. In step 108, there is spin and rinse fill for an

additional 20 seconds. During step 108, the clutch 45 is limiting the speed of the basket 32, effectively reducing or eliminating the escape of water from the basket 32. In step 110, the spin cycle continues for 70 seconds. In step 112, there is a combination of spin and spray for 15 seconds. Then in step 114, there is a spin cycle for 65 seconds. In step 116, the quick wash has ended. In this embodiment, the wash takes 12 minutes plus the time to fill the washer with wash water. The present invention is in no way limited to any specific time periods, but rather these time periods are merely exemplary.

Therefore, a method and apparatus for a quick wash cycle has been disclosed that decreases rinse time by pausing a spinning basket for spraying rinse water to allow for spray rinse without splashing.

The present invention contemplates numerous variations in the structure and methodology. It should be understood that the foregoing relates only to the exemplary embodiments of the present invention, and that numerous changes may be made therein without departing from the spirit and scope of the invention as defined by the following claims.